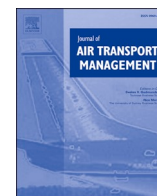




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# A SWOT analysis of China's air cargo sector in the context of COVID-19 pandemic

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## ABSTRACT

This paper discusses the situation of China's air cargo sector facing the COVID-19 pandemic. Based on the expectation that it can go out of recession more easily than China's air passenger sector, this paper analyzes four aspects that are favorable and unfavorable for its further development: (1) strengths (China's sustainable economic basis and proliferating cargo suppliers), (2) weaknesses (insufficient cargo capacity and less business internationalization), (3) opportunities (top authority support, rising e-commerce demand, and new technological momentum), and (4) challenges (uncertain trade environment and increasing profitability pressure). Then this paper suggests strategies for China's air cargo suppliers to adapt to the pandemic.

## 1. Introduction

China's Wuhan shutdown on January 23, 2020, one day before the eve of Chinese New Year 2020, started worldwide social isolation against the COVID-19 pandemic. Various preventive measures have dramatically changed the environment of transport. Civil aviation in China, much like the situation elsewhere in the world,<sup>1</sup> has entered another winter after the market shrinkage caused by the 2003 SARS epidemic. Although since late March, the spread of coronavirus has been controlled within its border, China still faces pressure to prevent case importation. As limiting air transport service may help contain the transmission of coronavirus (Zhang et al., 2020), since March 29 China has officially reduced the international air routes: each Chinese airline can only maintain one route to any specific country with one flight per week; while each foreign airline can only maintain one route to China with one flight per week.<sup>2</sup> Moreover, "circuit breaker" flight regulations

came into force on June 4.<sup>3</sup> Only in one month after that, two airlines were mandated to suspend their international routes because an excessive number of passengers on their flights were tested positive for coronavirus.<sup>4</sup> Normalization of epidemic prevention and control indicates that the restrictive measures in air transport will persist for a long time.

The coronavirus pandemic has a different influence on Chinese airlines' passenger traffic and their freight traffic. Since epidemic prevention measures in aviation were mainly targeted at air passengers, air cargo has suffered a less severe depression. Fig. 1 compares the trend of passenger traffic and cargo traffic handled by Chinese airlines before and after the coronavirus outbreak. It can be expected that air cargo can go out of this recession more easily than passenger transport: by the end of May 2020, air passenger traffic has yet recovered to half of last year's level, but air cargo traffic had been very close to last year's level. In fact, air cargo finished by dedicated freighter aircraft in May grew by 21.8%

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<sup>1</sup> International Civil Aviation Organization, 2020. 1.5 billion fewer international air travelers this year according to latest ICAO forecast. <https://www.icao.int/Newsroom/Pages/Billion-fewer-international-air-travellers-this-year-according-to-latest-ICAO-forecast.aspx> (accessed July 3, 2020).

<sup>2</sup> Civil Aviation Administration of China (CAAC), 2020. Notice on reducing international passenger flights during the epidemic prevention and control period. [http://www.caac.gov.cn/en/XWZX/202003/t20200326\\_201748.html](http://www.caac.gov.cn/en/XWZX/202003/t20200326_201748.html) (accessed July 3, 2020).

<sup>3</sup> CAAC, 2020. Notice on adjusting international passenger flights. [http://www.caac.gov.cn/XXGK/XXGK/TZTG/202006/t20200604\\_202928.html](http://www.caac.gov.cn/XXGK/XXGK/TZTG/202006/t20200604_202928.html) (accessed July 3, 2020).

<sup>4</sup> CGTN, 2020. CAAC suspends Southern Airlines Dhaka-Guangzhou flight for 4 weeks due to COVID-19. <https://news.cgtn.com/news/2020-06-14/COVID-19-CAAC-suspends-Southern-Airlines-Dhaka-Guangzhou-flight-RjiSkZ9Fte/index.html> (accessed July 3, 2020); CGTN, 2020. China Sichuan Airlines halts Cairo-Chengdu flight over COVID-19 cases. <https://news.cgtn.com/news/2020-07-01/China-Sichuan-Airlines-halts-Cairo-Chengdu-flight-over-COVID-19-cases-RM1reWJaXm/index.html> (accessed July 3, 2020).

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than the same period of last year.<sup>5</sup> However, due to the spike in COVID-19 cases in Beijing, June 11,<sup>6</sup> Chinese airlines' passenger traffic cannot be expected to overrun half of last year's level by August.

China's air transport industry has always been affected by significant historical events, which have been documented by previous literature. Zhang (1998) reviewed the reforms in China's civil aviation following China's opening-up and examined their impact on the development of China's airline industry. Chow (2010) found that non-state-owned airlines had better performance than state-owned airlines in efficiency improvement, partly confirming the success of China's industrial liberalization policy in 2004. The mergers between Chinese airlines also contributed to productivity improvements and technical changes (Chow and Fung, 2012). Wang et al. (2014) found that Chinese airlines enjoyed low input prices, but this cost advantage was diminishing.

However, the specific discussion on China's air cargo sector has been scarce. Jiang et al. (2003) provided a forecast of China's air cargo demand through 2020 based on the association between economic development and air cargo traffic. Wu et al. (2013) also concluded that rising demand provided Chinese airlines with opportunities to develop air cargo business. Air cargo is likely to become some Chinese airlines' primary business rather than by-product (Merkert et al., 2017).

China's air transport industry has come to another critical time in terms of its adaptation to the COVID-19 pandemic. It is much needed to conduct a specific analysis of China's air cargo sector in consideration of its particular situation and environment. This article presents a SWOT (strengths, weaknesses, opportunities, and threats) analysis of China's

air cargo sector. It is hoped that this structured examination of the factors relevant to its current and future status may help illustrate the strategies for advancing its further development.

## 2. Strengths of China's air cargo industry

### 2.1. Promotion by economic development

China transported 7.53 million tonnes of air cargo in 2019, an increase of 1.9% than in the previous year. As demonstrated in Fig. 2, over the last decade, China's air cargo traffic showed a growing trend by and large. Air cargo can be viewed as an indicator of a nation's macroeconomic trend (Kasarda and Green, 2005; Kupfer et al., 2017). China's rapid economic development underpinned its air cargo growth in the last decade. In the coming decades, China will transit its economy from prioritizing high growth rates to a more balanced and stable path. As consumption and service create new levels of transportation demand, a booming future can still be expected for China's air cargo market.

### 2.2. The proliferation of freight-only airlines

Dedicated freighter aircraft play an essential role in providing safe and efficient air transport services (Budd and Ison, 2017). Now, there are a total of 175 dedicated freighter aircraft in China, of which 170 are operated by specialized cargo airlines (see Table 1 for details). In 1997, China Post, a national postal enterprise, created the first freight-only

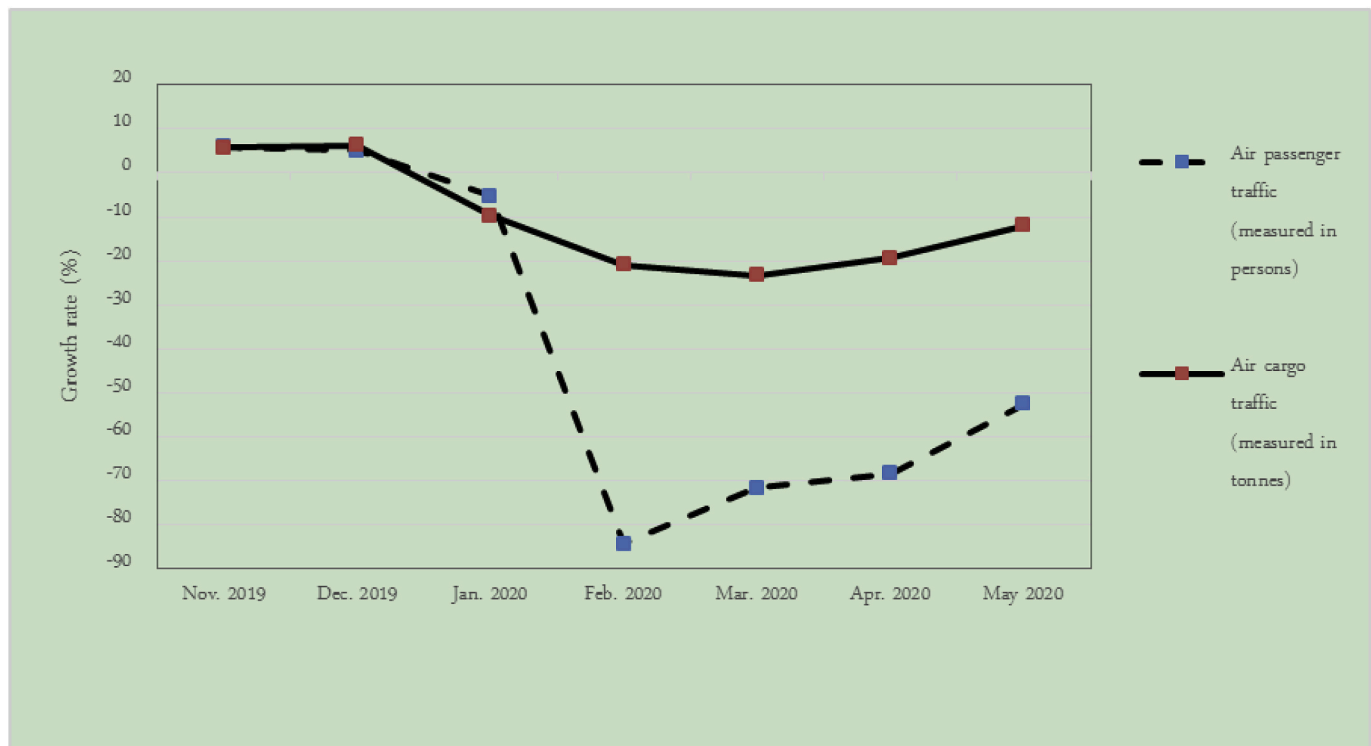


Fig. 1. Comparing Chinese airlines' air passenger traffic and air cargo traffic by year-on-year growth rate, Nov. 2019 to May 2020. Source: Monthly statistics of major transport production indexes of China's civil aviation, Civil Aviation Administration of China (CAAC).

<sup>5</sup> China News, 2020. The decline of main production indicators of civil aviation narrowed in May. <http://www.chinanews.com/cj/2020/06-10/9208336.shtml> (accessed July 3, 2020).

<sup>6</sup> CNN, 2020. Beijing's new outbreak is a reminder to the world that coronavirus can return at any time. <https://cnnphilippines.com/world/2020/6/19/Beijing-new-coronavirus-outbreak-.html> (accessed July 3, 2020).

airline in China, China Postal Airlines. From 1998 to 2003, three state-owned trunk airlines' subsidiaries, namely China Cargo Airlines, Air China Cargo, and China Southern Cargo Airlines, started their dedicated freighter service consecutively. Since 2004, enterprises with diversified ownership have entered into this industry (Chow, 2010). In 2009, 2014, two private delivery courier companies, SF and YTO, created SF Airlines and YTO Cargo Airlines, respectively, both of which

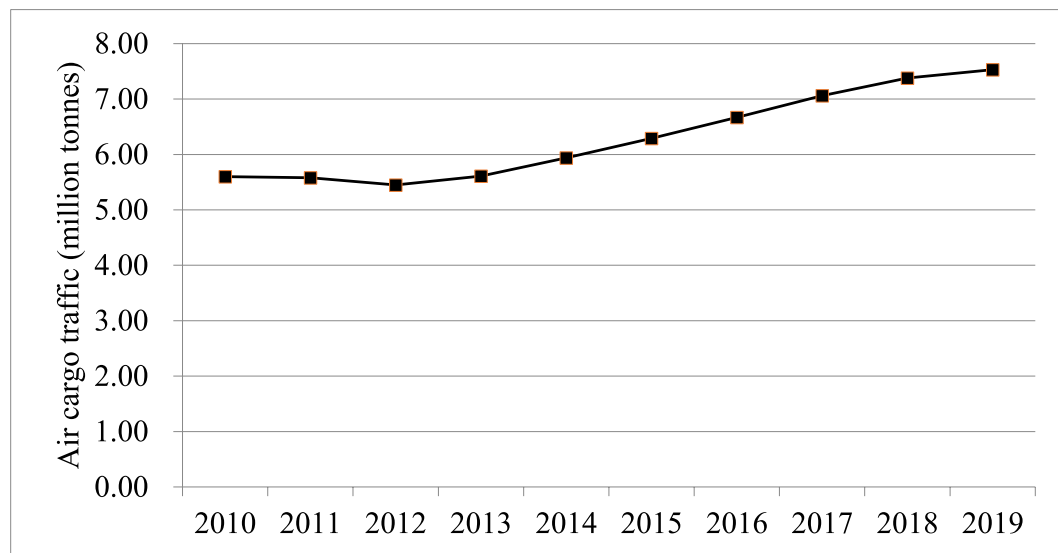


Fig. 2. China's air cargo traffic, 2010–2019.

Source: The statistic gazette on the development of civil aviation (2010–2019), CAAC.

Table 1

Freighter scales of all-cargo airlines in China (May. 2020).

Name of airline	Number of cargo aircraft	Aircraft type					
		B737F	B747F	B757F	B767F	B777F	A300
China Cargo Airlines	9		3			6	
Air China Cargo	15		3	4		8	
China Southern Cargo Airlines	16		2			14	
Suparna Airlines	12	9		3			
China Postal Airlines	27	20		7			
SF Airlines	58	17	2	31	8		
YTO Cargo Airlines	12	7		5			
Uni-top Airlines	10		3				7
Tianjin Air Cargo	4	4					
China air cargo	1			1			
China Central Longhao Airlines	6	6					

Source: Author's collection from the internet.

have developed rapidly in these years. Moreover, in 2019, SF acquired DHL's supply chain business in China and thereby evolved from an express delivery enterprise to a supply chain enterprise.<sup>7</sup> E-commerce companies represented by JD and Cainiao have also developed their business in air logistics. Airlines flying both passengers and cargo can adopt different types of strategies towards air cargo business (Doganis, 2006), but China's combination airlines are more likely to follow a subsidiary strategy in the future.

### 3. Weaknesses of China's air cargo industry

#### 3.1. Deficient air cargo capacity

Chinese airlines use cargo aircraft and passenger aircraft's bellyholds to carry air cargo, and cargo aircraft accounted for only 4.5% of the total fleet scale. Accordingly, aircraft's bellyholds have played a more important role in China's air cargo service. In 2019, Chinese airlines finished 48.6% of the international air cargo traffic (measured in tonnes) by aircraft's bellyholds, and 51.4% by cargo aircraft. But for the

domestic air cargo traffic, the proportion finished by aircraft's bellyholds was about 70%, a more significant portion than that of cargo aircraft.<sup>8</sup> However, as shown in Fig. 3, the Wuhan shutdown commenced a sharp decline in the execution of flights, causing severe deficiency of cargo capacity, especially bellyholds capacity. Meanwhile, as the coronavirus crisis expands, the demand for medical and personal protective equipment soars in many places around the world. In this context, the deficiency of Chinese airlines' international cargo capacity looks more severe.

#### 3.2. Less participation in the international market

China's air freight suppliers have not been very competitive in the international market, accounting for about 30% of the total cargo traffic of inbound and outbound China. In the days of Chinese New Year, international cargo service often goes into a slack season, and many foreign airlines cut cargo flights to China. This fact worsened the situation in the early time of the coronavirus outbreak when China needed plenty of medical protective materials from abroad. Consequently, many air passengers back to China were called to carry the materials collected

<sup>7</sup> Cargo Facts, 2018. SF Express' parent company to acquire DHL's supply chain ops in China. <https://cargofacts.com/allposts/logistics/express/sf-express-parent-company-to-acquire-dhls-supply-chain-ops-in-china/> (accessed July 3, 2020).

<sup>8</sup> Shi, X., Luo, Y., Zhou, L., 2020. The situation of China's air cargo market under the epidemic situation: solutions and suggestions, in: China Aviation Newspaper, 3 March 2020.

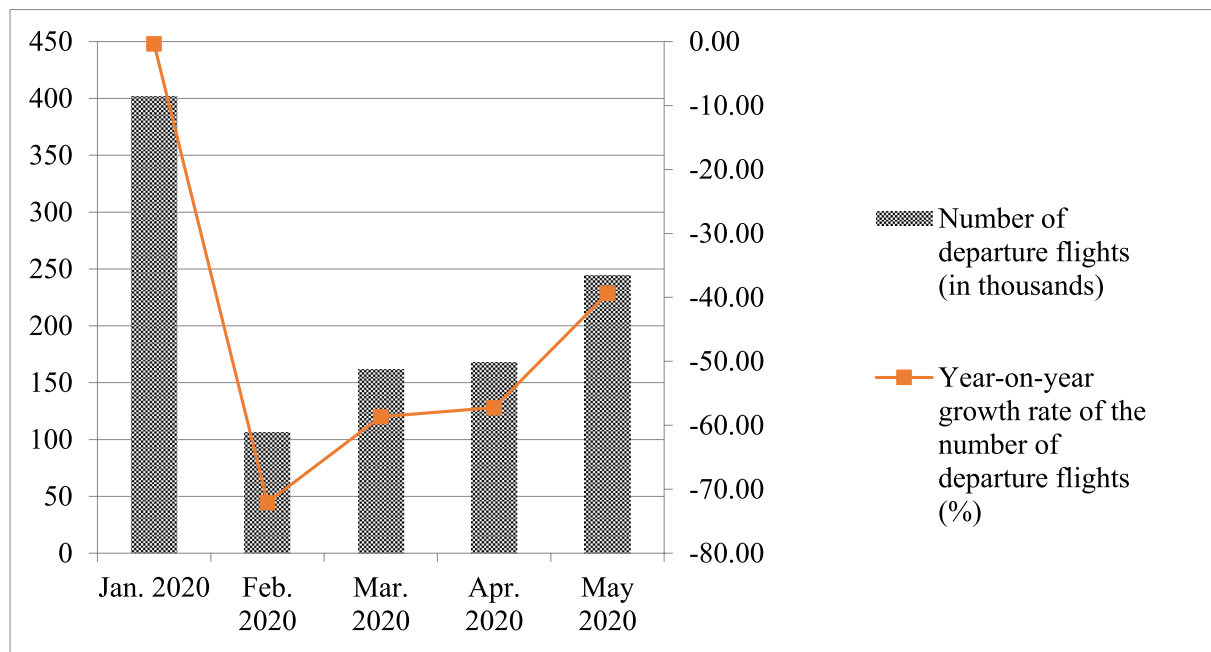


Fig. 3. Execution of departure flights from China's mainland airports, January 2020 to May 2020. Source: Airsavvi.

from other countries as their luggage.<sup>9</sup> Later, as the epicenter moved away and China became a significant supplier of epidemic prevention materials, many Chinese airlines were inspired to open up international cargo flights by converting passenger aircraft to cargo aircraft.<sup>10</sup> This measure may lessen the deficiency of international cargo capacity in China.

#### 4. Opportunities for China's airfreight development

##### 4.1. Support from the top-level authority

Government policies are crucial for the development of air cargo in China (Jiang et al., 2003). The deficiency of air cargo capacity has been recognized by China's state council, confirming that the pandemic has revealed China's drawbacks in professionalized air cargo transport and a complete system of cargo airports. China's top authority has decided to issue policies to improve China's air freight capacity and enhance the competitiveness of China's airlines in the international logistics market.<sup>11</sup> Government support would help eliminate the factors hampering air cargo efficiency. A case in point is that through government coordination, a green channel was opened for Chinese airlines to transport

emergency relief materials to Wuhan in the most difficult time.<sup>12</sup> Another green channel has also been established for Chinese airlines to apply for passenger to cargo conversions.<sup>13</sup>

##### 4.2. Rising demand for e-commerce express delivery

China's digital economy has experienced tragic growth over the last decade. In about 2010, China accounted for less than 1% of the global e-commerce market; but now its share is 42%.<sup>14</sup> The development of e-commerce has promoted the rapid growth of express delivery in China. Ten years ago, Chinese people used express delivery for less than two pieces per year; but in 2019, they used express delivery for more than 45 pieces per year.<sup>15</sup> The fast-growing demand for express delivery encouraged two express delivery enterprises, SF and YTO, to open their air cargo service. Moreover, transnational e-commerce has been targeted as another breakthrough for boosting foreign trade, with the designation of 51 cities as the pilot areas for cross-border e-commerce import<sup>16</sup> and the establishment of 18 pilot free-trade zones.<sup>17</sup> Transnational e-commerce will provide renewed impetus for China's air cargo industry. Even during the pandemic period, several new cargo routes,

<sup>9</sup> The Website of Overseas Chinese, 2020. Overseas Chinese supported the coronavirus fight: 2 tonnes of medical materials were carried to China "bodily". <http://www.chinaqw.com/hqhr/2020/01-29/244331.shtml> (accessed July 3, 2020).

<sup>10</sup> China's Civil Aviation Online, 2020. The booming air cargo industry: the orders of passenger to cargo conversion are scheduled to 5 years later. <http://www.ccaonline.cn/wuliu/586885.html> (accessed July 3, 2020).

<sup>11</sup> China News, 2020. Li Keqiang presided over an executive meeting of the State Council to further improve China's international air cargo capacity. <http://www.chinanews.com/gn/2020/03-24/9136488.shtml> (accessed July 3, 2020).

<sup>12</sup> News of Civil Aviation Administration, 2020. A green channel was opened to assist the transportation of medical materials to Wuhan. [http://www.caacnews.com.cn/1/2/202001/t20200131\\_1291446.html](http://www.caacnews.com.cn/1/2/202001/t20200131_1291446.html) (accessed July 3, 2020).

<sup>13</sup> Civil Aviation Administration of China, 2020. Circular on the establishment of "green channel" for international air freight during the epidemic prevention period. [http://www.caac.gov.cn/XXGK/XXGK/TZTG/202004/t20200409\\_201952.html](http://www.caac.gov.cn/XXGK/XXGK/TZTG/202004/t20200409_201952.html) (accessed July 3, 2020).

<sup>14</sup> World Economic Forum, 2018. 42% of global e-commerce is happening in China: here's why. <https://www.weforum.org/agenda/2018/04/42-of-global-e-commerce-is-happening-in-china-heres-why/> (accessed July 3, 2020).

<sup>15</sup> Chen, Y., 2020. China's per capita use of express delivery increased 22 times in the past decade, in: Beijing Business Daily, January 15, 2020.

<sup>16</sup> The State Council of China, 2020. Ministry of Commerce and other six departments further expanded the scope of cross-border e-commerce pilot areas. [http://www.gov.cn/xinwen/2020-01/17/content\\_5470348.htm](http://www.gov.cn/xinwen/2020-01/17/content_5470348.htm) (accessed July 3, 2020).

<sup>17</sup> The State Council of China, 2019. Reply of the State Council Concerning the approval of the establishment of six new pilot free trade zones. [http://www.gov.cn/gongbao/content/2019/content\\_5428462.htm](http://www.gov.cn/gongbao/content/2019/content_5428462.htm) (accessed July 3, 2020).



including the Zhengzhou-New York route and Changsha-Moscow route, were opened mainly for transnational e-commerce.<sup>18</sup>

#### 4.3. New momentum produced by new technologies

In the fight against the coronavirus, some new technologies and devices have been used to transport medical and preventive materials. Among them, cargo drones providing contactless and accurate delivery at the destination are the most conspicuous. On February 12, SF used drones to transport a total of 70 Kg medical preventive materials to Wuhan Jinyintan Hospital.<sup>19</sup> On February 16, JD used drones to disinfect some crowded areas of Ordos City; on February 18, JD performed another low-altitude disinfection service using drones for the hospitals and communities of Dalad Banner, Inner Mongolia Region.<sup>20</sup> Also, blockchain technology has great potential to promote the development of logistics technology (Tijan et al., 2019). These technologies will give Chinese airlines new momentum in air cargo development.

### 5. Threats to China's air cargo development

#### 5.1. The complication of external trade environment

Besides the COVID-19 pandemic, China's external economic environment has become shakier in recent years. As China becomes a pillar of the global economy, it will be confronted with pressures from other places in the world. The US-China trade war cannot be expected to come to an end soon. It leads to declining demand in global air freight markets.<sup>21</sup> Although China seeks new opportunities through the One Belt and One Road Initiative, an affirmative repay cannot be guaranteed due to the complicated political and economic situations in different participating states and the lack of rigid institutions and norms for implementation (Wang, 2019). International air freight is a barometer of international trade, and the unstable external economic environment will cause an unpredictable impact on the development of China's air cargo industry.

#### 5.2. Increasing pressure on profitability

The experience of China's air cargo industry during the 2003 SARS period (Fig. 4) tells that the current dilemma may be temporary. However, coronavirus is more infectious and spread more broadly, and accordingly, it is likely to have a more extensive impact on China's air freight industry than SARS. Chinese airlines now face more intense competition in the air cargo market than in 2003, and the epidemic control requirements bring about additional costs of fulfilling these requirements. Many enterprises face a tight financial chain.

### 6. Suggestions for the development of air cargo enterprises

The above sections provide an analysis of the internal strengths and weaknesses of China's air cargo industry as well as their external

opportunities and threats in the context of the COVID-19 pandemic. Since this article focuses on the impact of the pandemic (a changing external environmental factor) on China's air freight enterprises, suggestions on WO/WT strategies are accordingly provided as follows:

#### 6.1. Enhancing the sense of responsibility and preparing for market rejuvenation

The COVID-19 pandemic concerns everyone. With their fast and efficient service, air cargo enterprises have become the most important carriers for transporting medical and personal protective equipment. Air cargo enterprises should have a sense of social responsibility and take more active action to transport medical relief materials. They can cooperate with the agencies responsible for public health, ground traffic, and customs and other institutions to establish a convenient and efficient reaction mechanism. Besides, as the epidemic situation gets better, demand for the transport of common goods will rise. Thus air cargo enterprises should prepare well by increasing their freight capacity, and this is also a necessary response to e-commerce development in China.

#### 6.2. Increasing the input on digital logistics

When performing their service during the epidemic period, some enterprises have achieved the integration of transport and distribution by the adoption of intelligent logistics technology. For instance, JD used big data to analyze historical delivery orders and population distribution in areas with infected cases, thereby forecasting future orders' tendencies. In doing so, it gave priority to orders from the critical hospitals in Wuhan and achieved accurate distribution and delivery of medical supplies.<sup>22</sup> Air cargo suppliers should attach more importance to the establishment of intelligent supply chains by inputting digital logistics technologies.

#### 6.3. Improving integrated service on the supply chain

Traditional freight enterprises relying on a single logistics park to carry out business may meet difficulties in the context of the COVID-19 pandemic. In contrast, those with their supply chains have shown better performance. For instance, Cainiao accomplished efficient supply and delivery of medical materials to the forefront of the epidemic by close collaboration with the upstream suppliers of masks and protective clothes as an integrated part of its supply chain system.<sup>23</sup> Air cargo enterprises can gain advantages by extending their service from pure air freight to an all-encompassing supply chain.

#### 6.4. Providing customized service

In a more competitive market, it is worthwhile for air cargo enterprises to cultivate their core competitiveness by the provision of customized services. On the one hand, given the growing demand for e-commerce express delivery, they can strengthen their cooperation with e-commerce platforms and provide door-to-door express delivery service. There are business opportunities in the transport of medical, cold-chain, and fresh items, if their service meets the special requirements of those customers. On the other hand, they can adopt a more flexible pricing strategy in response to the changing external market environment. By subdividing the freight market, different pricing strategies can be implemented for orders varying in routes, seasons, and items.

<sup>18</sup> Xinhua Net, 2020. Changsha opened its first regular freight route for transnational e-commerce. [http://www.xinhuanet.com/2020-05/28/c\\_1126046194.htm](http://www.xinhuanet.com/2020-05/28/c_1126046194.htm) (accessed July 3, 2020); Henan Daily, 2020. The full cargo route Zhengzhou-New York had the first flight. <https://www.henandaily.cn/content/2020/0506/229347.html> (accessed July 3, 2020).

<sup>19</sup> Xinhua Net, 2020. Delivery of epidemic prevention materials by drones: 7 min to the designated hospital. [http://www.hb.xinhuanet.com/2020-02/13/c\\_1125570871.htm](http://www.hb.xinhuanet.com/2020-02/13/c_1125570871.htm) (accessed July 3, 2020).

<sup>20</sup> News of Civil Aviation Administration, 2020. Drones of JD Logistics completed low altitude disinfection. [http://www.caacnews.com.cn/thpd/2020/t20200217\\_1293024.html](http://www.caacnews.com.cn/thpd/2020/t20200217_1293024.html) (accessed July 3, 2020).

<sup>21</sup> International Air Transport Association, 2019. US-China trade war weighs heavily on air cargo. <https://www.iata.org/en/pressroom/pr/2019-10-09-01/> (accessed July 3, 2020).

<sup>22</sup> Beijing News Net, 2020. How did JD guarantee stable transport in an extraordinary period? <http://www.bjnews.com.cn/finance/2020/02/12/688408.html?from=singlemessage&isappinstalled=0> (accessed July 3, 2020).

<sup>23</sup> China Traffic News, 2020. Support for the coronavirus fight: more than 60 million medical supplies were delivered by Cainiao. [http://www.zgjtb.com/2020-03/15/content\\_238691.htm](http://www.zgjtb.com/2020-03/15/content_238691.htm) (accessed July 3, 2020).

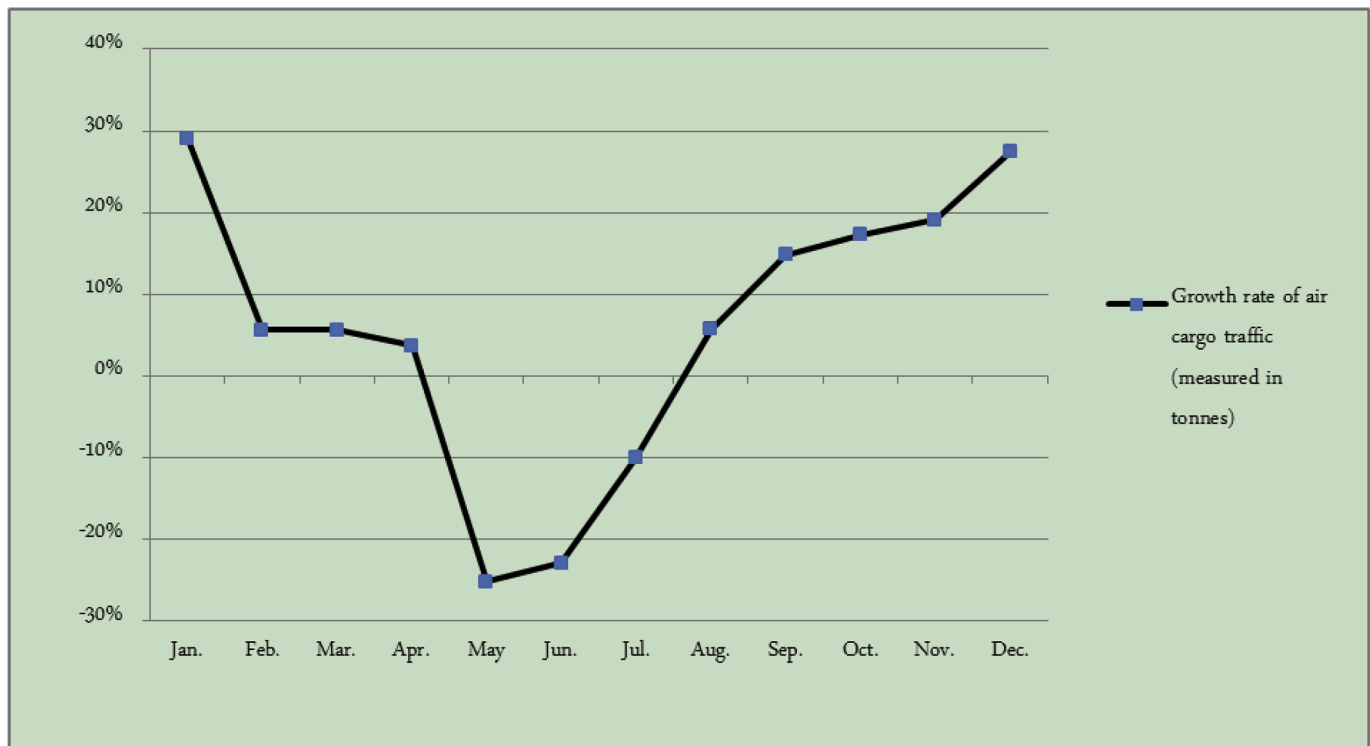


Fig. 4. The trend of Chinese airlines' cargo traffic in 2003.

Source: Monthly statistics of major transport production indexes of China's civil aviation, CAAC.

## 7. Concluding remarks

The COVID-19 epidemic was firstly reported and early controlled in China, but its spread around the world will impact China's civil aviation for a long time. This article specifically examined China's air cargo sector in consideration of its particular situation under the pandemic background. The discussion illustrates that China's air cargo industry's potential is optimistic, but constraints such as lacking cargo capacity should be overcome for its adaption to this critical period. Indeed, the pandemic has highlighted the significance of China's air cargo sector, and China's sustainable economic condition provides a solid foundation for its growth. Predictably, it can go out of the recession more easily than air passenger transport in China and achieve development in the near future.

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## Author statement

Tao Li: Conceptualization, Methodology, Data curation, Writing-Original draft preparation, Writing - Reviewing and Editing.

## Declaration of competing interest

The author declares that there is no relationship with any other

people or organizations that could inappropriately influence his work in this article.

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